

Algebra 2 - Factoring

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“Why do children dread mathematics? Because of the wrong approach. Because it is looked at as a subject.” – Shakuntala Devi

Note: It is expected that you try the examples to the best of your understanding, and complete the problem sets by the test date and ask for help where needed.

1 GCF and 4 Term Factoring

In order to multiply binomials, follow 4 steps:

1. Multiply First Terms
2. Multiply Outside Terms
3. Multiply Inside Terms
4. Multiply Last Terms

Example: Multiply $(x - 4)(3x - 5)$.

Solution: $3x^2 - 17x + 20$

Factoring the greatest common factor is also a way to factor expressions.

Example: Factor $12x^5 - 15x^3 + 9x^2$.

Solution: $3x^2(4x^3 - 5x + 3)$

Four Term Grouping has 4 steps:

1. Factor out the greatest common factor
2. Group the first two terms and the last two terms together.
3. Factor out the greatest common factor of each group, now you should have another common greatest common factor.
4. Factor out the greatest common factor.

Example: Factor $x^2 + 3x + 4x + 12$.

Solution: $(x + 3)(x + 4)$

2 Trinomials

In order to factor trinomials in the form $ax^2 + bx + c$, follow these steps:

1. Factor out the greatest common factor.
2. Multiply $a \cdot c$ and find the factors of $a \cdot c$ that add up to b .
3. Use these factors to split the middle (bx).
4. Factor by four term grouping.

Example: Factor $x^3 + 2x^2 - 15x$.

Solution: $x(x + 5)(x - 3)$

3 Binomials

The difference of squares is given as $a^2 - b^2 = (a + b)(a - b)$.

Example: Factor $169 - x^2$.

Solution: $(13 + x)(13 - x)$

The sum of cubes is given as $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$.
The difference of cubes is given as $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Example: Factor $2x^3 + 250$.

Solution: $2(x + 5)(x^2 - 5x + 25)$